

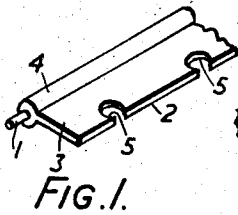
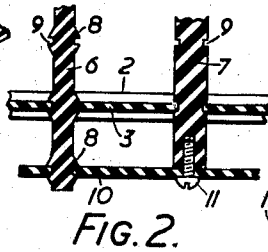
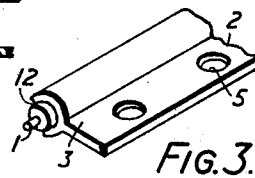
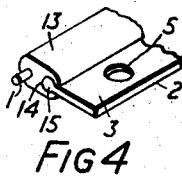
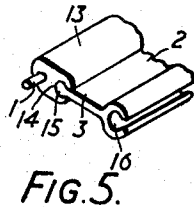
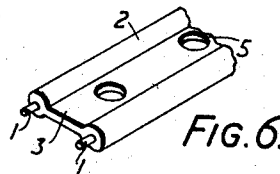
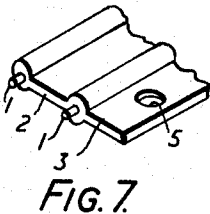
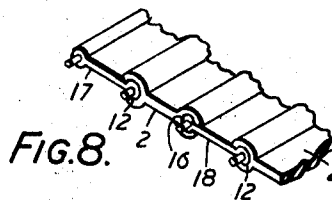
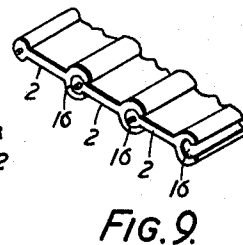
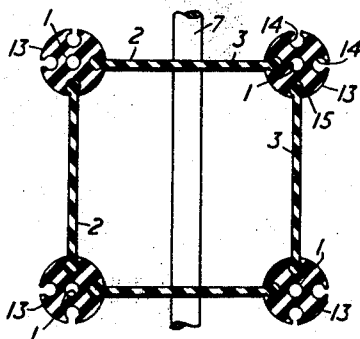
Oct. 22, 1963

L. J. COUND

3,108,154

APPARATUS FOR SUPPORTING ELECTRICAL CONDUCTORS

Filed April 23, 1962



INVENTOR
LAURENCE JOHN COUND

BY *Hane and Nydied*
ATTORNEYS

1

3,108,154

APPARATUS FOR SUPPORTING ELECTRICAL CONDUCTORS

Laurence John Cound, Letchworth, England, assignor to International Computers and Tabulators Limited
Filed Apr. 23, 1962, Ser. No. 189,601
Claims priority, application Great Britain June 22, 1961
5 Claims. (Cl. 174-70)

The present invention relates to apparatus for supporting electrical conductors.

Electrical conductors are frequently used, for example in communications or computing apparatus, to carry high frequency electrical signals. In arrangements of this kind it is undesirable that the conductors be bunched together in a conventional cable form since this may give rise to excessive "cross-talk" between the conductors. On the other hand, screened wiring has the disadvantage that the capacitance between the conductors and earth may be excessively high. It has been found that air-spaced open wiring provides a satisfactory solution. It has previously been proposed to provide "in-line" feeders in which a number of conductors are supported at constant lateral spacing within a ribbon of insulating material. However, in any run of such a feeder, the number of conductors required may vary from point to point and it is obviously uneconomic to provide a feeder having the maximum number of conductors throughout the run when this maximum number may only be required for a relatively short distance.

It is an object of the present invention to provide improved apparatus for supporting conductors.

According to the present invention apparatus for supporting electrical conductors includes a conductor supporting element comprising an elongated tape-like member of resilient material, having at least one long edge formed to support an elongated conductor along its length parallel to and at a fixed distance from the longitudinal axis of the tape-like member, and further having means for engaging fixed supporting means by reason of its inherent resilience, said fixed supporting means following a predetermined path and the engaging means being positioned with respect to the longitudinal axis of the tape-like member to maintain a constant distance between said predetermined path and said longitudinal axis.

Apparatus embodying the present invention will now be described, by way of example, with reference to the accompanying drawing, in which,

FIGURE 1 shows a tape-like conductor support,

FIGURE 2 is a sectional view of an arrangement for supporting a conductor,

FIGURES 3, 4 and 5 show other forms of tape-like conductor supports,

FIGURES 6 and 7 show tape-like supports for twin conductors,

FIGURES 8 and 9 show tape-like supports for a number of conductors, and

FIGURE 10 is a sectional view of apparatus for supporting a number of conductors.

Referring now to FIGURE 1, an electrical conductor 1 is supported by means of a tape-like member 2 of resilient insulating material. The member 2 consists of a flat web 3 and a part 4 lying along one side and formed round the conductor 1. The latter part 4 may conveniently be formed round the conductor by an extrusion process. The web 3 is pierced at intervals by apertures 5 and the apertures are all arranged at a fixed distance from the longitudinal axis of the member 2.

As shown in FIGURE 2, the member 2 may be supported by rigidly mounted posts 6, 7, the posts engaging the apertures 5. FIGURE 2 shows, in sectional view, two examples of suitable mounting posts. The left-hand

2

post 6 as shown in the drawing is a rod-like member, preferably of similar material to the member 2. A number of projections 8 are provided at spaced intervals along the member 6 and a pair of oppositely facing projections 8 provides a slot 9. The post 6 is mounted in a hole in a supporting plate 10, the post being advanced through the hole until the supporting plate is engaged by one of the slots 9, the resilience of the material of which the post 6 is made allowing the projections 8 to be deformed in order to permit the plate 10 to enter the slot 9 and thereafter to lock the post 6 into position. In a somewhat similar manner an aperture 5 is engaged with another of the slots 9 in the post 6. Hence, the spacing between the support plate 10 and the conductor is determined by the spacing of the slots 9 on the post 6. It will be appreciated that a further conductor supporting tape 2 may be engaged with another slot in the rod 6 and that a pair of conductors supported in this way may be used to form an air-spaced twin feeder.

It will be realised that the rods 6 may be produced in long lengths and cut off as necessary to any required length.

The right hand post 7 as shown in the drawing is of alternative construction and is a rod having a similar number of spaced apart slots 9. In this case, however, the rod may be of inflexible material secured to the support plate 10 by means of a screw 11. The web 3 is engaged by means of an aperture 5 with the post in a somewhat similar manner to that described for the post 6, the resilience of the web 3 allowing the apertures to be deformed in order to permit the passage of the post and thereafter locking the web into the required position on the rod by the engagement of an aperture 5 with a groove 9.

It will be realised that the rods, such as 6 or 7, are spaced apart at intervals corresponding to the spacing of apertures 5 in the web 3 of the member 2 along the predetermined path or route to be followed by the conductor 1. Since the conductor is supported at a constant fixed distance from the longitudinal axis of the member 2 and the path defined by the rods is also at a constant fixed distance from this axis, it follows that the conductor is always spaced from the path by a fixed distance.

The tape-like member 2 as shown in FIGURE 1 is formed round the conductor 1 but it will be appreciated that the member does not need to be integral with the conductor. It is sufficient that one side of the member 2 is formed to support the conductor. For example, as shown in FIGURE 3, the member 2 may have an elongated aperture or open socket 12, formed integrally with the web, extending along one long edge and arranged so that a conductor 1 inserted therein is retained and supported therein by reason of the inherent resilience of the material. For convenience similar parts in the figures are referenced with similar numerals. It will be appreciated that the conductor 1 may be insulated before being inserted into the aperture 12 or that the aperture 12 may be so proportioned that it accommodates an uninsulated conductor. However, it is to be understood that the term conductor is used herein and in the annexed claims to include an insulated or uninsulated conductor and it will be appreciated that in all cases the conductor is maintained at a constant distance from the longitudinal axis of the tape. The apertures 5 in the web may be wholly contained within the web 3 as shown in FIGURE 3 or they may be, as shown in FIGURE 1, so positioned that they extend to the edge of the tape.

It will be appreciated that the inner surface of the aperture 12 forms a mating surface which is engageable with a complementary mating surface (in this case, the circumference) of the conductor. Hence, it follows that these mating surfaces are interchangeable. For example,

3

FIGURE 4 shows an example of a conductor and support member which have their mating surfaces reversed with respect to the form of construction shown in FIGURE 3. The conductor 1 is insulated by a moulding 13 having a cross-sectional profile including an aperture 14 which engages a projection 15 carried by one long side of the tape-like member 2. The member 2 has a web 3 which is pierced by apertures 5 as in previously described embodiments.

FIGURE 5 shows an alternative form of the tape-like member 2. In this case the transverse apertures 5 are omitted from the web 3 of the member 2 and, instead, a longitudinal aperture 16 is formed along the opposite edge of the web 3. The aperture 16 forms an open socket similar to the previously described aperture 12. As in the case of the apertures 5, the aperture 16 is at a fixed distance from the longitudinal axis of the member 2. In this case the member 2 is supported by a longitudinal support bar having a suitable profile to be engaged by the aperture 16, and the support bar then defines the predetermined path to be followed by the conductor. Thus, as before, a constant distance is maintained between the path and the conductor.

A further modification to the members described with reference to FIGURES 1 and 2 is shown in FIGURE 6. In this case the member 2 has the usual web 3 carrying the apertures 5. The member 2 in this case supports two conductors 1, one along each longitudinal side. It will be apparent that both conductors 1 are supported at a constant distance from the predetermined path defined by the supporting posts or rods. Moreover, the conductors are mutually spaced by a fixed distance determined by the width of the web 3. Hence, this form of construction constitutes a twin feeder. The part of the web 3 carrying the aperture 5 may be extended to one side of both conductors and this form of construction is shown in FIGURE 7. It will also be appreciated that in the form of construction shown in FIGURE 7 the transverse apertures 5 may be omitted and a longitudinal aperture substituted along the free edge of the web, similar to the aperture 16 of FIGURE 5.

Using the twin feeder as shown in FIGURE 6, it will be appreciated that this feeder may be supported by a tape-like member 2 having an aperture 16 along one edge for engagement with a support member and an aperture along the other edge. This latter aperture then embraces one of the conductors of the twin feeder in the manner illustrated by the aperture 12 of FIGURE 3. Using this form of construction a multi-way feeder may be built up as indicated in FIGURE 8 and this form of construction is particularly suitable for suspending the feeder from a longitudinal rod which, as previously noted, then defines the predetermined path. As shown in FIGURE 8, the extreme left-hand twin feeder 17 is supported by a first tape like member 2, an aperture 12 embracing one of the feeder conductors. The aperture 16 then embraces one of the conductors of a second twin feeder 18. Thus, this conductor of the feeder 18 serves as a support member for the feeder 17. The opposite conductor of the twin feeder 18 is then supported in turn by a second tape-like member 2.

Hence, it will be obvious that an array of conductors in parallel formation may be built up in this manner and may include as many conductors as are required, one of the outer feeders being supported by a tape-like member engaged with a fixed support and each succeeding feeder of the formation being supported in turn by the engagement of a tape-like member with a preceding conductor of the formation. Thus the intermediate conductors engaged by tape-like members themselves define the path to be followed by the succeeding conductors of the formation. The outer member 2 engaged with the fixed support may have a single supporting aperture 16 or it may be supported by rods passing through apertures 5 as previously described.

4

It will also be apparent that the members 2 shown in FIGURE 8 may be used merely for maintaining the twin feeders at constant lateral spacing, the resultant multi-way feeder being supported by apertures 5 in the webs of the members 2 or in the webs of the feeders 17 or 18, the apertures 5 being engaged with support rods. In the latter case the web of the feeder supports each of the conductors in the feeder, and in both cases the path to be followed is defined, as previously described, by the disposition of the support rods.

A further variant of this multi-way feeder construction is shown in FIGURE 9. In this case each conductor supporting member is somewhat similar to that shown in FIGURE 1 with the modification that a longitudinal aperture 16 replaces the transverse apertures 5 as described with reference to FIGURE 5. Here again, the conductors are arranged in parallel formation, the aperture 16 of the outer support member 2 of the formation being engaged with a fixed support and the apertures 16 of each succeeding member 2 being engaged with the preceding conductor of the formation. Hence, as before, the path to be followed is initially defined by the support member and each of the conductors in the formation, except the last, defines the path to be followed by the succeeding conductors.

It will be appreciated that the foregoing arrangements for the formation of a multi-way feeder are particularly advantageous in that any number of ways may be built up by using only a few extruded sections. In the case of FIGURE 8 a twin feeder formation is used in conjunction with a supporting extrusion and in the case of FIGURE 9 only a single conductor-carrying extrusion is used. These arrangements also have the advantage that a feeder may enter or leave the assembly at any point along its route. It will also be appreciated that the conductors and supporting members may be separate, as shown, for example in FIGURES 4 and 5. In this case the shape of each supporting aperture 16 must be such that it embraces the insulation 13 formed round the succeeding conductor.

In a further variant, the insulation 13 applied to the conductor 1 has a number of apertures 14 each arranged to mate with a projection 15 of a supporting tape 2. This arrangement is shown in FIGURE 10 where four conductors 1 are arranged in quad formation. The entire formation is conveniently supported by posts 7 similar to those shown in FIGURE 2 which engage apertures 5 in the webs 3 of the supporting tapes 2. Again, it will be seen that this formation can be extended by the addition of further tapes and conductors to provide a multi-way formation and, again, only two extrusions are needed for this purpose. As previously described, the posts, such as 7, are arranged along the predetermined path to be followed by the conductors and the tape-like members serve both for supporting the conductors and for maintaining a fixed spacing between them.

What is claimed is:

1. An arrangement for supporting electrical conductors including an elongated tape-like member of resilient material having at least one long edge formed to support an elongated electrical conductor along its length parallel to and at a fixed distance from the longitudinal axis of the member; a series of spaced apart apertures formed along the length of the member; and a series of fixed grooved posts arranged to define a path to be followed by the member, said posts being spaced apart to correspond to the spacing of apertures in the member, and said apertures in the member being respectively engaged with the grooves in the posts.

2. An arrangement for supporting an electrical conductor including an elongated member of resilient material having a central web portion of substantially constant width, a supporting portion along one long edge of the web formed integrally therewith about a conductor and an integrally formed longitudinal open socket along the

5

opposite long edge of the web; and a fixed rod-like member arranged along a predetermined path to be followed by the member, said socket being engaged with said rod-like member.

3. An arrangement for supporting electrical conductors including an elongated member of resilient material having a web portion of substantially constant width, a supporting portion formed integrally with the web about a conductor and extending along at least one long edge of the web portion; a series of spaced apart apertures formed along the length of the web portion; and a series of fixed grooved posts arranged to define a path to be followed by the member, said posts being spaced apart to correspond to the spacing of apertures in the member, and said apertures in the member being respectively engaged with the grooves in the posts.

4. An arrangement for supporting electrical conductors including an elongated member of resilient material having a web portion of substantially constant width, a conductor supporting portion formed integrally with the web and extending along at least one long edge thereof, said conductor supporting portion having a mating surface; at least one elongated conductor having a complementary mating surface, the conductor being supported by said supporting portion by the engagement of said mating surfaces; a series of spaced apart apertures formed along the length of the web portion; and a series of fixed grooved posts arranged to define a path to be followed by the member, said posts being spaced apart to correspond to the spacing of apertures in the member, and

6

said apertures in the member being respectively engaged with the grooves in the posts.

5. An arrangement for supporting an array of electrical conductors including a plurality of tape-like members of resilient material, each member having a web portion of substantially constant width and conductor engaging portions formed integrally with the web and extending along both long edges thereof; a plurality of conductors each formed to engage with the conductor engaging portions of at least two tape-like members, the conductors of the array being supported in spaced apart parallel formation by engagement with conductor engaging portions of said plurality tape-like members; a series of spaced apart apertures formed along the length of the web portions of at least selected ones of said tape-like members; and a series of fixed grooved posts arranged to define a path to be followed by the array, said posts being spaced apart to correspond to the spacing of apertures in said selected members, and said apertures in the selected members being respectively engaged with the grooves in the posts.

References Cited in the file of this patent

UNITED STATES PATENTS

25	2,433,346 2,888,511	Deakin ----- Guritz -----	Dec. 30, 1947 May 26, 1959
----	------------------------	------------------------------	-------------------------------

FOREIGN PATENTS

30	633,894 314,763 1,077,737	Great Britain ----- Switzerland ----- Germany -----	Dec. 30, 1949 Aug. 15, 1956 Mar. 17, 1960
----	---------------------------------	---	---